

## Microfabricated, 94 GHz, 25 W, Helical Traveling Wave Tube, Phase II

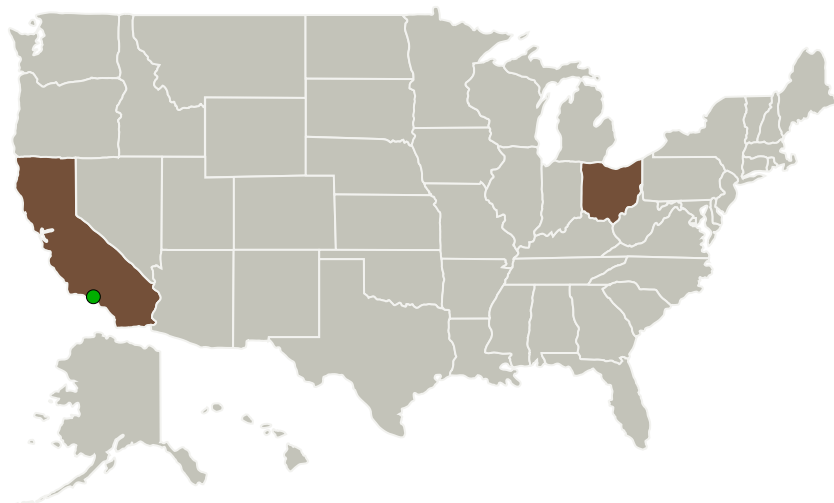
Completed Technology Project (2012 - 2014)



## Project Introduction

Teraphysics Corporation completed the Phase I objectives for the electrical design of a 94 GHz, 26 W TWT with 53% overall efficiency, including the helical circuit with efficiency enhancing taper, input/output couplers, electron gun, magnetic circuit and multistage depressed collector. The device includes a novel, microfabricated, helical circuit with electron beam propagating above the helix rather than through the middle. In addition to completing all of the proposed Phase I objectives, we designed vacuum windows, made significant progress on the mechanical design, fabricated the electron gun electrodes and circuit block, and conducted machining trials, and brazing experiments. The successful Phase I results at 94 GHz along with Teraphysics' proven results at 95 and 650 GHz warrant further development of the 94 GHz TWT in a Phase II program. If awarded, we will apply our relevant experience and the Phase I results to fabricate, assemble, and test a 94 GHz TWT. The advantages of implementing high efficiency TWT amplifiers into NASA spacecraft compared to the current state of the art include lower system power requirements, reduced payload volume and reduced thermal management challenges.

## Primary U.S. Work Locations and Key Partners



Microfabricated, 94 GHz, 25 W, Helical Traveling Wave Tube Project Image

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Organizations Performing Work	Role	Type	Location
Teraphysics Corporation	Lead Organization	Industry	Cleveland, Ohio
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California	Ohio
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## Project Transitions

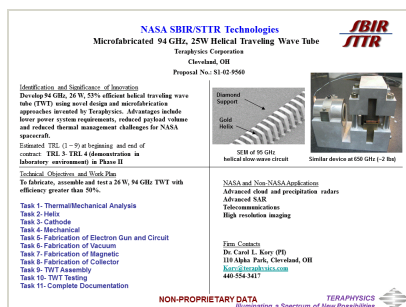
**April 2012:** Project Start

**November 2014:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137381>)

## Images



## Project Image

Microfabricated, 94 GHz, 25 W, Helical Traveling Wave Tube Project Image  
(<https://techport.nasa.gov/image/135281>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Teraphysics Corporation

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Principal Investigator:

Carol L Kory

## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



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### Technology Areas

#### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
  - └ TX08.1.2 Electronics

### Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System